1995 Ruth Lyttle Satter Prize in Mathematics

The Ruth Lyttle Satter Prize was established in 1990 using funds donated by Joan S. Birman of Columbia University in memory of her sister, Ruth Lyttle Satter. Professor Satter earned a bachelor's degree in mathematics and then joined the research staff at AT&T Bell Laboratories during World War II. At the age of forty-three, after having raised a family, she received a Ph.D. in botany from the University of Connecticut at Storrs, where she later became a faculty member. Her research on the biological clocks of plants earned her recognition in the U.S. and abroad. Professor Birman requested that the prize be established to honor her sister's commitment to research and to encourage women in science.

The $4,000 prize is awarded every two years to recognize an outstanding contribution to mathematics research by a woman in the previous five years. Previous recipients are Dusa McDuff (1991) and Lai-Sang Young (1993).

The 1995 Satter prize was awarded to SUN-YUNG ALICE CHANG of the University of California at Los Angeles. The prize was presented at the 101st Annual Meeting of the AMS in San Francisco in January 1995. The prize is awarded by the AMS Council acting through a selection committee consisting of Cathleen S. Morawetz (chair), William P. Thurston, and Lai-Sang Young.

The text that follows contains the committee's citation, the recipient's response, and a brief biographical sketch.

Sun-Yung Alice Chang

Citation

The Ruth Lyttle Satter Prize is awarded to Sun-Yung Alice Chang for her deep contributions to the study of partial differential equations on Riemannian manifolds and in particular for her work on extremal problems in spectral geometry and the compactness of isospectral metrics within a fixed conformal class on a compact 3-manifold.

Response

It is an honor for me to receive the prize. Since all the work cited above is joint work with my coauthors (Paul Yang for the most part, but also Tom Branson and Matt Gursky), I would like to express my indebtedness to them.

The problems which I have been working on in the past few years are mainly connected with the study of extremal functions of Sobolev inequalities. Such functions play an important role in the study of the blow-up phenomenon in a number of problems in geometry. Following the early work of J. Moser and influenced by the

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work of T. Aubin and R. Schoen on the Yamabe problem, P. Yang and I have solved the PDE of Gaussian/scalar curvatures on the sphere by studying the extremal functions for certain variation functionals. We have also applied this approach in conformal geometry to the isospectral compactness problem on 3-manifolds when the metrics are restricted in any given conformal class. More recently we have been studying the extremal metrics for these functionals. We are working to derive further geometric consequences. This latter piece of work is a natural extension of the earlier work by Osgood-Phillips-Sarnak on the log-determinant functional on compact surfaces.

Since the Satter Prize is an award for women mathematicians, one cannot help but to reflect on the status of women in our profession now. Compared to the situation when I was a student, it is clear that there are now many more active women research mathematicians. I can personally testify to the importance of having role models and the companionship of other women colleagues. However, I think we need even more women mathematicians to prove good theorems and to contribute to the profession.

Biographical Sketch

Sun-Yung Alice Chang was born on March 24, 1948, in Ci-an, China. She received her B.S. from National University of Taiwan (1970) and her Ph.D. from the University of California, Berkeley (1974). She was an assistant professor at the State University of New York at Buffalo (1974–1975), then became Hedrick Assistant Professor at the University of California, Los Angeles (1975–1977). She moved to the University of Maryland, College Park, where she was an assistant professor (1977–1980). At the University of California, Los Angeles, she was an associate and then a full professor (1980–). In 1988–1989 she was also a full professor at the University of California, Berkeley.

Professor Chang has served on various AMS committees and given several invited addresses at AMS meetings. She was also a speaker at the International Congress of Mathematicians (Berkeley, 1986). She was a Sloan Fellow (1979–1980) and a member of the Board of Mathematical Sciences (1990–1992) of the National Academy of Sciences. She has served on the Advisory Panel for the Mathematical Sciences of the National Science Foundation (1990–1992) and on the selection committee for the Noether Lectures of the Association for Women in Mathematics (1991–1994).

Her research interests include the study of geometric type nonlinear partial differential equations and related extremal (Sobolev) inequalities and problems in isospectral geometry.